Date: January 17, 2018

TO: Victor Lay, City Administrator

FROM: Philip Stuckert, P.E. Infrastructure Director
Caryl Giles, Water Treatment Plant Director

SUBJECT: Professional Services Agreement with Dempsey Dilling and Associates, P.C.

Recommendation:

Request the Board of Mayor and Aldermen to review this memorandum concerning Spring Hill's immediate and future needs for water supply and then consider authorizing Dempsey, Dilling and Associates, P.C. along with their subconsultant O'Brien and Gere to prepare a facility plan report, in the amount of Two-Hundred Ninety Thousand Dollars ($290,000.00). Monies for this work will come from the Water Reserve Fund.

The report will address expansion of the Spring Hill Water Treatment Plant from 4.0 MGD (current design capacity) to a 6 MGD facility, with the understanding the plant may be expanded in the future to 10 MGD if TDEC approves the withdrawal of additional water from the Duck River. (Spring Hill's current withdrawal permit is for 6.0 MGD.) The facility plan will be coordinated and submitted to TDEC for review and approval consideration.

Summary:

This draft memo provides an update regarding Spring Hill's water supply options, and a preliminary outline and timeline for activities related to securing additional water supply to meet Spring Hill's needs through 2037.

Spring Hill City staff and their consultant, Dempsey, Dilling and Associates, P.C. along with O'Brien & Gere met on December 5, 2017, with Columbia Power & Water Systems (CPWS). The purpose of the meeting was to discuss water supply strategies over the next twenty years (2017 – 2037) between the two communities. Others at the meeting included representatives from Maury County Water System (MCWS). MCWS desires to purchase water from the City of Spring Hill for development east of Interstate 65 and south of the Saturn Parkway interchange. The property east of I-65 is within the City of Spring Hill but is served water by MCWS district. MCWS wishes to purchase additional water from the City of Spring Hill, from the existing 18-inch water line located along Derryberry Lane.

Each party at the meeting was asked to provide an overview of their water demands for the next twenty years and how that demand might be supplied.

The table below provides the projected increase in maximum day demands on MCWS from the new development, located east of I-65, over the next twenty years. MCWS used a 1.8 peaking factor (middle column). Following discussions at the meeting, it was concluded that a 1.5 peaking factor (same as Spring Hill uses) may be more realistic (right column). MCWS desires to purchase water for the new development from either Spring Hill or CPWS. Economically it makes sense for MCWS to purchase

their water from Spring Hill due to lower capital costs of transmitting the water supply from CPWS to the east side of I-65. The water would either be conveyed through a new transmission line (CPWS to MCWS connection point east of I-65) or through Spring Hill's existing water distribution system with required upgrades.

| MCWS Projected Water Demands for New Development East of Interstate 65 | | |
|---|---|---|
| Time Period | Maximum Day (gpd) at end of period with 1.8 Peaking Factor (as provided by MCWS) | Maximum Day (gpd) at end of period with 1.5 Peaking Factor |
| 2018 to 2022 | 619,200 | 516,000 |
| 2023 to 2027 | 1,238,400 | 1,032,000 |
| 2028 to 2032 | 1,483,200 | 1,236,000 |
| 2033 to 2037 | 1,728,000 | 1,440,000 |

CPWS withdraws water from the Duck River at the Columbia pool, above the Columbia dam, and treats it at its water treatment plant, which has been previously reported as having 20 mgd production capacity. CPWS said they recently determined that the net reliable capacity is actually only 16.4 mgd. The reductions were reportedly due to several factors:

- Problems using alum as their coagulant when the raw water is cold; CPWS experienced filter clogging and excessive backwashing
- Hydraulic restrictions created by the new GAC and UV facilities
- Use of water for spray-irrigation of residuals.

The following table provides CPWS's projected maximum day demands, inclusive of the current and future MCWS service areas. These projections do not include water sales to Spring Hill (i.e., they exclude the current 2.88 mgd sales contract with Spring Hill). CPWS has developed projections using a range of peaking factors, but proposed using a 1.55 maximum day peaking factor, as presented in the table below.

| CPWS and MCWS Combined Demand and Supply Projections | | | |
|---|---|---|---|
| Time Period | Maximum Day (gpd) at end of period using 1.55 Peaking Factor | Plant Supply 16.4 MGD WTP* plus new 8.0 MGD WTP after 2024 | Deficit (-) or Surplus (+) |
| 2018 to 2023 | 16,000,000 | 16,400,000 | 400,000 |
| 2024 to 2027 | 17,100,000 | 24,400,000 | 7,300,000 |
| 2028 to 2032 | 18,400,000 | 24,400,000 | 6,000,000 |
| 2033 to 2037 | 20,000,000 | 24,400,000 | 4,400,000 |

Spring Hill has a 6 mgd rated intake on the Duck River and a 4 mgd rated raw water pumping station and water treatment plant. The facilities are designed for a relatively simple expansion to 6 mgd. The following table provides Spring Hill's projected maximum day demands, using a peaking factor of 1.5, and does not include service to the new development in the MCWS service area east of Interstate 65.

| Spring Hill Demand and Supply Projections | | | |
|---|---|---|---|
| Time Period | Maximum Day (gpd) at end of period using 1.5 Peaking Factor* | Plant Supply* | Deficit (-) or Surplus (+) |
| 2018 to 2023 | 6,000,000 | 6,000,000 | 0 |
| 2024 to 2027 | 7,400,000 | 6,000,000 | -(1,400,000) |

| | | | |
|---|---|---|---|
| 2028 to 2032 | 8,700,000 | 6,000,000 | -(2,700,000) |
| 2033 to 2037 | 10,000,000 | 6,000,000 | -(4,000,000) |

* The "deficit/surplus" calculation assumes the WTP has been expanded to 6 mgd, and the existing 2.88 mgd contract with CPWS has expired in the spring 2019.

The above table shows that Spring Hill requires 10 mgd to meet their 2037 maximum day demands, which exceeds the current intake capacity (6 mgd) and the current pumping and treatment capacities (4 mgd).

Proceeding with the anticipated expansion of the raw water pumping station and WTP to 6 mgd will satisfy projected demands through 2023. The projected 4 mgd deficit in 2037 will require expansion of the water supply to 10 mgd, or an agreement to purchase 4 mgd from CPWS.

At the December 5 meeting, CPWS announced that its current WTP was not able to produce 20 mgd and therefore must be reduced to 16.4 mgd. As a result of the "derating", CPWS said they may not be able to deliver the existing full contracted 2.88 mgd to Spring Hill beyond 2019. CPWS indicated they would likely not be able to renew the agreement at that time, although it would seem possible to extend it at lesser amounts until they fully utilize their 16.4 mgd WTP capacity in around 2024. As a result of the Duck River Agency Water Study and intake site recommendations, CPWS is planning for a new intake at "Alexander Bend" and a new WTP nearby. CPWS has purchased 75 acres and plans to have the new intake and WTP in operation by 2024. CPWS indicated they planned to construct 8 mgd of treatment capacity for themselves and MCWS, and invited Spring Hill to financially participate in the project, saying they are open to a larger WTP (greater than 8 mgd) with the method of cost sharing yet to be determined. Presumably, CPWS would also be willing to sell water to Spring Hill, given that they would have spare capacity through 2037, even if they only construct 8 mgd.

The net effect is that due to the derating of the existing Columbia WTP, and the likelihood that CPWS will not be able to renew the water sales agreement in 2019, Spring Hill faces the need to quickly expand their WTP to exercise the full 6 mgd intake permit withdrawal allowance, and simultaneously develop a long-term strategy that relies either on purchasing water from CPWS when their new WTP is completed (2024), or securing a new permit to expand Spring Hill's own water supply beyond 6 mgd by that same time.

*As a result, there is a need for the recommended facility plan for expanding the Spring Hill WTP to 6 mgd, while also evaluating the feasibility of securing a permit for a new withdrawal from Duck River and developing cost estimates for constructing a new intake and water treatment plant to increase the City's water supply to 10 mgd. This construction could be completed in phases, with expansion to 8 mgd by 2024 and to 10 mgd by about 2030, if TDEC approves the withdrawal of additional water from the Duck River, based on current projections for Spring Hill (excluding a feed to MCWS for the new development).*

**PROPOSED TIMELINE**

<u>January, 2018</u>

1. Present updated report to BOMA on findings from the CPWS meeting on December 5, 2017, covering:

a. CPWS's derated WTP capacity, and its impact on the City's current water purchase agreement; ability to provide water supply to Spring Hill between 2019 and 2024; impacting the original timeline to expand the city's water treatment plant set for 2027.
b. CPWS plans to construct a second WTP by 2024 to supply an additional 8 mgd to Columbia and MCWS, recognizing that a new 8 mgd plant would also provide spare capacity to serve Spring Hill through approximately 2037.
c. Acquire authorization from BOMA to authorize a contract extension with Dempsey, Dilling and Associates and their subconsultant O'Brien and Gere to develop a facility plan to expand the Spring Hill Water Treatment Plant (WTP)to 6 mgd.

<u>February-March, 2018</u>

1. Develop scope of work with DDA and OBG for Facility Plan for the Spring Hill WTP
   a. Using information collected from the Water Capacity Study, examine and evaluate individual unit processes at the water treatment plant for expansion to a 6 mgd plant

   b. Preliminary scope of services for a Facility Plan to expand Spring Hill WTP shall include:
      i. Assess ability of existing WTP site to accommodate a larger WTP
      ii. Identify need for treatment process upgrades
      iii. Conduct meetings with TDEC to explore requirements for increasing withdrawal from Duck River (currently permitted for 6.0 MGD and request additional withdrawal to 10 MGD).
      iv. Develop concept plans and costs for expansion of existing Spring Hill facilities to 6 mgd, 8 mgd and 10 mgd +/-, reflecting the projected demands for Spring Hill in 2023, 2030, and 2037, respectively.
      v. Prepare a technical report summarizing the findings including deficiencies and project costs to upgrade the plant.
2. Examine the feasibility of providing water service to outside water service customers such as MCWS. Prepare a technical memorandum addressing the advantages and disadvantages of water service.

<u>April-June 2018</u>

1. Finalize Professional Services Agreement with DDA along with OBG as their subconsultant and present to BOMA for approval.
2. DDA/OBG initiate the above assignments and conduct progress meetings with City Management and staff to further refine the project, cost estimates, and time schedules. Provide project cost figures (Engineering, Design, and Construction Cost) to upgrade WTP to a 6 mgd facility for submission to the BOMA and City staff for FY 2018 budgeting request

<u>July, 2018 through December, 2018</u>

1. Complete the Facility Plan for 6 mgd WTP with options for expansion up to 10 mgd and conduct work sessions with City staff and BOMA
2. Conduct reclaimed water study (this may be required by TDEC)
   a. Direct/indirect potable reuse
   b. Use of reclaimed water for non-potable purposes to offset potable demands

<u>February, 2019</u>

1. CPWS/Spring Hill two-year water sales agreement expires (Spring Hill maximum day water demand projected to be 4.83 mgd in 2019)
   a. Assess extending the agreement, but at a lower capacity and lower minimum purchase

March, 2019

1. Develop Strategic Plan Report for BOMA discussing and selecting one of the following options:
    a. An agreement with CPWS for water purchases of up to 4 mgd to provide adequate water supply to 2037; or
    b. An agreement with CPWS to construct a larger (12 mgd) regional WTP to supply water to Spring Hill in lieu of expanding the Spring Hill WTP to 10 mgd, and providing water beyond 2037; or
    c. Further expand the Spring Hill WTP to 10 mgd for self-reliance of water supply and distribution through 2037.

Year 2019 through 2021

1. Submit completed Facility Plan for 6 mgd plant to TDEC for SRF funding.
2. Design and construct expansion of Spring Hill WTP from 4 mgd to 6 mgd, ***and***
3. If Spring Hill decides to expand the Spring Hill WTP from 6 mgd to 10 mgd, develop new scope of work for design and construction including the necessary work for permitting to acquire additional water from the Duck River.
4. Receive authorization from BOMA to extend professional services for design services to expand the existing water treatment plant to 10 mgd plant.

Year 2021

1. Spring Hill WTP at 6 mgd online (Spring Hill maximum day water demand projected to be 5.46 mgd in 2021)

Year 2023

1. Spring Hill maximum day water demands projected to reach 6 mgd